SD-MSS-1K series

Device information

SD-MSS-1KTM | SD-MSS-1KPMAI | SD-MSS-1KPMAu

for Torque Magnetometry in DC/Pulsed Field

Version 1.2
## Specifications

<table>
<thead>
<tr>
<th>Code</th>
<th>SD-MSS-1KTM</th>
<th>SD-MSS-1KPMAI</th>
<th>SD-MSS-1KPMAu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membrane size [μm]</td>
<td>200 square</td>
<td>200 square with coil</td>
<td></td>
</tr>
<tr>
<td>Membrane thickness [μm]</td>
<td>2.8 (typical)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chip dimensions [mm]</td>
<td>5.5 x 2.5 x 0.3</td>
<td>3.0 x 2.0 x 0.3</td>
<td></td>
</tr>
<tr>
<td>Resistance value [kΩ]</td>
<td>0.3 – 1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric configuration</td>
<td>Separated, 8 pads 0.25 (0.5) mm pitch</td>
<td><strong>Aluminum</strong> pads for wire bonding or gluing</td>
<td><strong>Gold</strong> pads for wire bonding or gluing</td>
</tr>
<tr>
<td>Piezoresistive cantilever</td>
<td>No</td>
<td></td>
<td>120 μm, 400 μm</td>
</tr>
</tbody>
</table>
### Features

**SD-MSS-1KTM**
- Reasonable chip size for comfortable handing
- Easy socket connection
- Possibility of changing structure by breaking beams

**SD-MSS-1KPMAI**
- Compact chip size for tight mounting space
- Platform with coil
- Two individual piezoresistive cantilevers
- 3 reference resistors
- Aluminum pads (SD-MSS-1KPMAI), Gold pads (SD-MSS-1KPMAu)

**SD-MSS-1KPMAu**
Handling of chips

To remove the chip from gel sheet, it is recommended to use a sharp plastic tweezers.

(1) Carefully push the tips of tweezers into the gel sheet, like to create a little space in between the chip back and the gel sheet. Don’t clamp the chip at this step.

(2) Slowly move the tips laterally and clamp the chip. Carefully pick up the chip.

Example: SIPEL 1315-SA

If the tips are too sharp, make them blunt.
Piezoresistive cantilever 400 μm

Torsional platform with coil

Piezoresistive cantilever 120 μm

References resistors
Device layout

SD-MSS-1KPMAI

Piezoresistive cantilever 120 μm

SD-MSS-1KPMAu

Piezoresistive cantilever 400 μm

Coil for calibration
The chip thickness is approximately 0.3 mm.

Approximate values, Unit [mm]
Dimensions

SD-MSS-1KPMAI

SD-MSS-1KPMAu

Piezoresistor

Al electrodes

Silicon nitride

Current to coil

Coil length: 700 μm

Silicon

Piezoresistor

Approximate values
Unit [μm]
All piezoresistors are identical.

If the potential of the silicon part should be 0V, the bridge voltage must be negative (V_{BRIDGE} < 0V).

This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.
Connection for the cantilevers

If the potential of the silicon part should be 0V, the bridge voltage must be negative ($V_{\text{BRIDGE}} < 0V$).

This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.

All piezoresistors are identical.
Device layout

SD-MSS-1KTM

Typical thickness: 2.8 μm
Typical application

SD-MSS-1KTM

Working images

Bending axis

Torsional axis
The chip thickness is approximately 0.3 mm.
Approximate values, Unit [mm]
If the potential of the silicon beams should be 0V, the bridge voltage must be negative ($V_{BRIDGE} < 0V$).

This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.
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All pads have to be connected by e.g., wire bonding.

If the potential of the silicon beams should be 0V, the bridge voltage must be negative ($V_{\text{BRIDGE}} < 0V$).

This is because the piezoresistors are $p$-type diffusions on $n$-type substrate and the potential of the silicon part becomes the highest potential available on the chip.
The following connectors are recommended for Torque Magnetometry applications.

- **Molex 54550 series**, e.g., 54550-0471 (4 pin), 54550-0571 (5 pin): Front slider type. Not simple to fix the chip, but the chip can be strongly clamped. The alignment between the pads on the chip and the connector pins is highly visible. The size of the connector is relatively big.


- **Panasonic Y5B series**, e.g., AYF530535A (5 pin): Back rotary clamp, easy to mount the chip. However, the chip is not strongly clamped compared to the connector mentioned above, which may be problematic in some applications. A big advantage is its compact size.


- **Hirose FH34(S) series**, e.g., FH34S-4S-0.5SH (4 pin): Back rotary clamp, easy to mount the chip. This connector has almost the same features as Panasonic one.

  http://www.digikey.ch/product-detail/en/hirose-electric-co-ltd/FH34S-4S-0.5SH(50)/HFT104TR-ND/2033607

- **Other bland** are of course usable if the following conditions are met.

  - FPC (Flexible Printed Circuit)/ FFC (Flexible Flat Cable) connectors
  - 0.5 mm pitch
  - For 0.3 mm-thick cable
  - Top, or top&bottom, contact
User options (Examples)

SD-MSS-1KTM

Breaking (cutting) out of beams by FIB (focused ion beam) or manual manipulator with sharp needle.

Please do this option at your own risk.
Tips for breaking beams

Manual breaking of beams is very challenging. However, it’s very convenient in some cases and save time.

- Place the chip up-side-down on a rough and hard surface, e.g., back surface of a single-side-polished silicon wafer.
- Use a sharp needle (e.g., oiler for watchmaker) and poke a beam.

Bergeon 30102-A Oilier (can be purchased on ebay)
(Polishing the flat part of the apex with oil-stone enhances the edge sharpness.)